self-fertilization. The flower is strongly proterandrous. The stamens are mature and shed their pollen co-incident with the expansion of the corolla. The fasciculus of pistils at this time, have not reached half their growth, and is completely covered by the stamens, which form a dense mass in the centre of the flower. During the day, and the one succeeding, humble and honey bees make this crown of stamens their resting-place. During these two days the pistils have not yet thrust their stigmas above the stamens that crown them. If now we cut a flower through longitudinally, we shall find that a very large quantity of pollen has fallen down within the bundle of pistils—this gathering of pollen being evidently aided by the feet of insects that made a landing-place of the staminal crown. Up to this time, however, the pistils not having come to maturity, the pollen thrust in among them would have no physiological significance. But on the morning of the third day, the pistils protrude and are in receptive condition, and they bring up with them large quantities of pollen, so completely covering the surface of each pistil that it would seem almost impossible for any grains of foreign pollen to find any lodgment for effective use; and though a grain of foreign pollen should get an opportunity to perform its function, it must be evident that the flower's own pollen has the earliest opportunities for usefulness, and must in almost every case be the fertilizing agent. An interesting note may be here recorded in reference to the power of own-pollen over fertility. Mr. Darwin in his "Cross- and Self-Fertilization," page 141, referring to his single experiment among malvaceous plants, *Hibiscus Africanus*, found a larger number of crossed flowers produced capsules than among the self-fertilizing ones; but in the case of these evidently self-fertilized flowers, no one seemed to fail in producing seed—every pistil, indeed, producing a perfectly fertile carpel. At the end of the third day the flowers closed, twisting in the opposite direction, as already noted.

On Projection of Pollen in the Flowers of Indigofera.—Exhibiting some flowers of *Indigofera Dosua*, Mr. MEEHAN remarked that the peculiar bending back of the carina in the flowers of Indigofera has been long known. Referring to the whole genus, Don, in the *General History of Dichlamydeous Plants*, published in 1837, says, "Keel furnished with a subulate spur on both sides, at length usually bending back elastically." In 1863 Decandolle and Treviranus, in *Botanische Zeitung*, page 3, refer to this bending back of the keel and say it is not an elastic motion, but simply a falling down on the full development of the flower; and the latter remarks, as quoted by Henslow, that "all these movements occur in the natural development of the parts, and only after self-fecundation takes place." Dr. Hildebrand, in the same magazine for 1866, seems to admit that finally the keel

will fall dow from sheer maturity, but thinks insects in the search for honey may anticipate this natural development. The Rev. Geo. Henslow, in the ix vol. (1868) of the *Journal of the Linnæan Society*, page 357, commenting on these statements, suggests that though self-impregnation may be possible, the jerkings of the stamens when the carina falls away, causes the pollen to scatter over the insects, which then carry the pollen to other flowers. In the x vol. (1869), p. 468, he notes that when the carina is liberated it falls back with a jerk, as noted by Don, and that the stamens fly up and closely press the vexillum. But no opportunity occurred to him of observing what insects effected this process which he accomplished artificially. In Mr. Meehan's grounds the East Indian *Indigofera Dosua* is a hardy shrub, and for the past two years, he said, he had watched the behavior of the flowers, and the insects that visited them. The carina is arched and hooded, and extends so far over the apex of the stigma, against which it presses, that both the stigma and column of stamens are borne down to a right angle with the vexillum. The effort of the stamens and pistil to rise, and of the carina to recurve, keeps these portions in an exactly horizontal position. The anthers burst while thus enclosed in the carina, but the pollen does not escape, nor does it reach the stigma, for the pistil extends beyond the anthers, and its apex is pressed strongly against the carina, and no pollen can possibly reach the apex. The two wings of the flower are caught in the subulate spurs, and are borne down to the horizontal plane with the carina. and together form a level platform on which insects in search of honey alight. Humble-bees, honey-bees, and numerous species of sand wasps visit the flowers, but in no instance was an insect's visit found to be effectual in liberating the stamens and pistil from the grasp of the carina. This was only accomplished by slitting the upper portion of the carina with a penknife. Then the divided carina would instantaneously fall back, and the stamens and pistil jerk upwards, scattering a little cloud of pollen in every direction. In some cases pollen so scattered would light on a stigma, but in many cases the pollen would be so completely projected that none could be traced to the stigma, and these probably received pollen from the upper flowers where they in turn projected their pollen. Possibly many were by this time too mature to profit by the pollen they received, at any rate only a very small proportion of the flowers matured seed vessels. In the older flowers, the carina evidently became separated from the stamens and pistil only when withering away.

Mr. Meehan remarked in conclusion, that, as noted by authors quoted, so far as his observations in this part of the world (Philadelphia) with this single species goes, the behavior of the flowers were neither favorable to self-fertilization nor cross-fertilization. If insects had pollen scattered on them, there is no way by which it could be communicated to the pistils of

other flowers. The stamens were not liberated naturally till the flower had lost all attractions for insects, and the act of liberating and scattering the pollen gave the pistil its first chance for pollinization. The great probability is that in the majority of instances the flowers are self-fertilized.

On Parallelism in Distinct Lines of Evolution.—Exhibiting some oak and chestnut leaves, Mr. MEEHAN remarked that the fact and the theory of evolution are distinct lines of thought. There seems no difficulty about the fact. That one form may and has been born of a pre-existing, and often very distinct form, cannot be disputed. What induces this change is another matter. It is here that science desires more light. A popular belief is that change of circumstances leads to change of form. This theory is embodied under the word "environment." In other words, plants, in their changes, are the "creatures of circumstances." In some sense this must be true. A seed will not sprout unless there be a necessary "environment" of heat and moisture, but this is not the sense in which "environment," as the term is here used, is generally understood. If one were to say that under a torrid temperature, endured for ages, a light-skinned, fair-haired Caucasian, might have descendents that were like woolly-headed, dark-skinned negroes, it would come nearer the general understanding of the term "environment," than some would limit it to. The speaker's observations and studies had led him to what might, perhaps, be regarded as the minority view. Circumstances—"environment"—seemed to have no further influence than to incite to action a change already ripe for development. In a paper read before the *American Association for the Advancement of Science*, 1874 (*See Proceedings Hartford Meeting*, p. 6, *Natural History*), he presented a number of facts to show that "change by gradual modification is not the universal law." New forms "jumped" into existence, and frequently these new forms were diverse from each other, under precisely the same "environment" so far as human knowledge had yet reached, as had been the surrounding circumstances of the parent form. Since that time he had contributed numerous observations to the *Proceedings of the Academy* and elsewhere, confirming these views.

To-night he would offer to the Academy some thoughts in a new line, but confirmatory of the same views. He exhibited some different forms of the American *Quercus Prinus*—the chestnut oaks, and a dwarf species from China, *Quercus Chinensis* of Bunge. Also some specimens of various forms of *Castanea Vesca*—the chestnut, and of *Castanea pumila*, *Mx.*, the chinquapin. It would be conceded by any evolutionist conversant with plant forms, that the chestnut and the oak are not remotely descended from the same parent. We may suppose, for the sake of argument, that "use or disuse," or some other item in the general catalogue of "environment" had affected some portion of the structure of the original parent, and resulted in a slight modification, leading